

## REMARKS

### **1. Amendments**

Claim 1 is amended to replace the sulfur range limitation therein with that of dependent claim 2.

The sulfur range limitation of claim 2 is replaced with a narrower range. Support for this narrower range is found in the published patent specification in paragraph [0024].

The informality of dependent claim 3 that is objected to by the Examiner is corrected.

Claims 30 and 31 are amended to correct certain informalities noted by the Examiner.

New claims 36 and 37 are added to the specification.

### **2. Claim Objections**

The Examiner has objected to claims 31-34 due to their improper form. It is submitted that the amendments to claims 30-31 have corrected any improper form noted by the Examiner.

### **3. §112 Rejection of Claims 1-2 and 3**

Claim 3 has been amended to address the Examiner's §112 rejection thereof.

Concerning claims 1-2, the applicant respectfully submits that there is no indefiniteness in the claim language. It is well established by case law that claimed ranges are not required to add up to precisely 100 %. It is clear from reading of the claim that the sulfur content of the claimed sulfur pellet must only be within the claimed percentage range and that there is no requirement that the sulfur content be 100%.

### **4. The §103 Rejections**

The Examiner has presented the following four obviousness rejections of the claims pending in this application:

- (1) §103 Rejection of claims 1-5 and 7-9 over Etnyre (US 4,756,763) in view of Gaw (US 3,960,585)

(2) §103 Rejection of claims 10-19, 30, and 35 over AU 9715194A in view of Etnyre and Gaw

(3) §103 Rejection of claims 20-24 over Gaw in view of Etnyre

(4) §103 Rejection of claims 25-29 over Etnyre in view of Gaw

The prior art relied upon by the Examiner to support the above rejections is summarized below.

### **AU 9715194 A**

The AU abstract teaches a method involving the heating and mixing of bitumen with hot granular heat exchange material that can be carried out in a pug mill. There is no mention of the use of sulfur and there is no mention of the use of sulfur suppressants.

### **US 4,756,763 to Etnyre**

Etnyre discloses asphalt compositions that include sulfur, but Etnyre does not teach a composition that is predominantly or close to entirely all sulfur that further has a concentration of a hydrogen sulfide suppressant. The Etnyre invention relates to a method of making and using an asphalt composition. The asphalt and sulfur are combined and made into a solid that may be transported to a remote site where it is heated and mixed with a material to be coated. Etnyre specifically teaches away from the compositions having a high sulfur content in that it states that it is desirable to keep the percentage of sulfur in the mixture to as low as is practical. *See* column 3, lines 55-56. The preferred ratio of sulfur-to-asphalt in the mixture is approximately 2.3:1, on a weight basis, and it should not exceed 4:1. *See, e.g.*, column 3, line 50 – column 4, line 6. A filler may also be added to the asphalt at the same time the sulfur is being mixed with it. *See* column 5, lines 37-56. Examples of the amounts of filler used in the mixture include 28.5% by weight of the mixture, 23 wt%, and 31 wt%. *See* column 5, line 57 – column 6, line 16. This mixture may also further be blended with a significant amount, *e.g.* 82.5 wt%, aggregate material, thus, making the amount of sulfur in the resulting mixture a very small percentage of the total. *See* column 6, lines 50-61.

There is no disclosure or suggestion by Etnyre of a high sulfur content composition that contains a hydrogen sulfide suppressant; and, in fact, the teachings of Etnyre are actually of a low sulfur asphalt-sulfur composition, such as those disclosed that contain a filler or both a filler and an aggregate. There is absolutely no suggestion or teaching by Etnyre of, and, there is a teaching away from, a method involving the formation of high sulfur content pellets with a suppressant concentration which are formed for the purpose of transporting them to a destination where the pellets are separately mixed with asphalt or aggregate, or both.

### **US 3,960,585 to Gaw**

Gaw teaches a process for casting a composition that necessarily comprises both sulfur and asphalt. This process includes using a hydrogen sulfide suppressant to suppress the formation or evolution of hydrogen sulfide during the preparation and casting of asphalt compositions that contain sulfur. Gaw does not teach the direct addition of a hydrogen sulfide suppressant to sulfur only; and, actually, Gaw teaches against first adding a hydrogen sulfide suppressant to sulfur prior to adding the resulting combination to an asphalt or mineral aggregate or combination thereof. Indeed, Gaw states that it is preferred to add the hydrogen sulfide suppressant to an asphalt component before it is mixed with the sulfur component. *See* column 2, lines 63-65. And, in the preparation of pavement compositions, where the asphalt and aggregate are mixed before the sulfur is added, it is preferred to add the suppressant to either the aggregate, or the asphalt, or the mixture of asphalt and aggregate, prior to the addition of sulfur. *See* column 2, line 65 – column 3, line 4.

A non-preferred sequence of addition is the addition of the suppressant to the asphalt mixture after the addition of sulfur in the mixing sequence. *See* column 3, lines 4-7. Gaw, thus, teaches that it is preferred to add the suppressant separately to the asphalt, or aggregate, or asphalt and aggregate compositions prior to the addition of sulfur to such compositions, and Gaw teaches that it is not preferred to add the suppressant after sulfur is added to any of the asphalt, or aggregate, or asphalt and aggregate compositions. This certainly fails to teach, and, actually teaches away from, the possibility of mixing a suppressant and sulfur pellet with the asphalt, or aggregate, or asphalt and aggregate compositions.

Gaw does not teach a composition that is predominantly or close to entirely all sulfur that further has a concentration of a hydrogen sulfide suppressant. But, Gaw does teach a sulfur-

asphalt mixture comprising sulfur, asphalt and aggregate having a weight ratio of sulfur-to-asphalt of at least 1:1 with the preferred ratio being from 2:1 to 5:1. *See* column 3, lines 8-11. The asphalt that is employed in this sulfur-asphalt mixture is an amount sufficient to bind the aggregate and is generally at least 3 weight % of the total weight of the composition with 4 to 7 wt% being especially suitable. *See* column 3, lines 34-38. The Example 1 composition of Gaw is a sulfur/asphalt/sand mixture respectively present in the weight percentages of 18%, 6%, and 76%. It is noteworthy that a relatively small percentage of the Gaw composition is asphalt, and, this percentage is so small that even if the ratio of sulfur-to-asphalt were to be relatively large, the total percentage of sulfur in the Gaw composition is small.

### **Argument**

The cited prior art references clearly fail to disclose high sulfur content compositions that contain a significant concentration of a hydrogen sulfide suppressant. And, in fact, the prior art references actually teach away from such compositions or their use in the formation of materials containing asphalt and sulfur used with aggregate materials that can be formed or used as a paving material. There is absolutely no suggestion in the prior art teachings that a sulfur pellet with a hydrogen sulfide suppressant may be formed at a separate location than which an asphalt composition is formed and where the sulfur pellet is added.

The composition of the sulfur pellet of independent claim 1 is not disclosed or taught by the cited references. No combination of the references teach a composition that is predominantly or close to entirely all sulfur and which further has a concentration of hydrogen sulfide suppressant. The compositions of independent claims 20 and 25 use either the partially closed transitional language “consisting essentially of” or the negative language “having a substantial absence of” to make it clear that the sulfur composition or pellet excludes the substantial presence of bitumen or aggregate, or both. With these limitations, it is absolutely clear that the claimed compositions are patentably distinguishable over the prior art.

Concerning the process claims, for example, independent claims 10, 15, and 30, the claim language clearly establishes that separate sulfur compositions or pellets are formed independently of certain of the recited steps of preheating or mixing of the bitumen and aggregate and that the

sulfur compositions or pellets are similar to those recited in the composition claims of the specification.

## **5. Conclusion**

In view of the above remarks, it is respectfully submitted that the now-pending claims are patentable. Thus, reconsideration of the Examiner's rejections and allowance of the pending claims is, therefore, respectfully requested.

Respectfully submitted,

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